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surmised, that the fish stranded in the lagoon were but a very small portion of the original shoal which entered Anderson's Cove, and thus, supposing the locality had been many times larger, there would have been no diminution in relative density of the dead fishes on its area.

Another example is recorded in the Journal of the Geological Society of London.\* Thousands of dead fishes, thrown on the coast of Madras, were afterwards enveloped in sand and mud along with other marine animals and plants, so as to form a densely packed stratum of fishes, etc., of unknown breadth, but extending for a vast distance along the coast-line. The fishes were supposed to have been destroyed by the enormous fall of rain from the south-west monsoon, rendering the sea-water less saline. Be that the cause or not, it is by such facts as these, compared with similar phenomena of by-gone epochs, that the geologist is enabled to arrive at just conclusions, and it is in this way that the science of geology is progressing.

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## THE ORCHIDS.

BY C. M. TRACY.

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It was the greatest step forward ever made at once in the study of plants, when Jussieu found out that there was a grand line of division running through the whole vegetable kingdom, with seeds on one side that might be split into two parts like the pea and the acorn, and those on the other that could not, like the kernel of corn and the grain of barley. For (not to tire the reader with technical words) it was directly seen that the same line would clearly distinguish between those plants that had a bark and made new wood between that and the older wood within, and thus *grew on*

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\* June, 1862.

*the outside*—between these and such as had no bark, but made the new wood in the midst of the pith, and so *grew on the inside*. Again, the *outside-growers*, like the oak and the pea, always have leaves with little veins forming an irregular net-work all through them; but the *inside-growers*, as the corn and the lilies, have the veins of their leaves running straight from one end to the other, and not netted at all, so that we can split such a leaf into strips very easily, and this makes a palm-leaf hat a possibility, which otherwise could not be. By this discovery Jussieu divided the vegetable kingdom quite as clearly and effectually as Alexander of Parma did the Dutch Republic, and without violating the rule of nature at all, wherein he had a great advantage over the other.

We speak of this natural difference in plants, because in talking over these royal families we have come to the point when we must step over this remarkable line. Most flowering plants are *outside-growers* (botanists say “Exogens,” and the reader may too, if he chooses; it means just the same thing), and they all have their leaves netted with veins and seeds separable into two halves. But the *Orchids*, of which we now speak, are *inside-growers* (or “Endogens”), have leaves that may be stripped into ribbons, and grow from seeds as indivisible as a buck-shot. Hence, there is no need to mistake this family for either of the preceding,\* not even in a single case; but as we have set out to indicate a few plain marks for the ready recognition of each order, it remains to state them for that under present notice.

If we examine an apple-blossom we find there are five leaves or petals in it, and all of them are just alike in form and size. This makes what is called a *regular* flower. The number matters nothing; the lily has six petals, the spider-wort three, the willow-herb four, and the enchanter’s nightshade two, and yet all are perfectly regular, for their form and size are the same all the way round the flower. Any

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\*The Asterids and Pisids, of which we have spoken in Vol. I. of the NATURALIST.

variation from this principle makes the flower *irregular*. The Pea-flower is irregular both in form and size, that of the Candytuft is so in size only, and that of the Larkspur chiefly in form. The Iris has a flower alike on all sides, and therefore regular, though the petals are in two sets of different shape; but the allied Gladiolus, with petals all of nearly the same size, is quite irregular, for their diverse form is such as turns the flower quite over to one side.

Now a certain mark of an Orchid is to have irregular flowers. In other families there is often a mixture of the two styles, but nothing of it here. And the most common observer will bear me out in calling these flowers irregular; for, setting aside all technicality, many cannot be reduced to any form, plan, or design, without a liberal stretch of confidence and ingenuity. So wide is their range of figure, and so perfectly bizarre are many of the shapes in which they appear, that one is tempted sometimes to believe they are animated creatures under some strange disguise of enchantment. Lindley tells us there is scarcely a common reptile or insect to which some of them have not been likened. Bees, crane-flies, long-legged spiders, toads, *et id omne genus*, all find the queerest of representatives in these protean blossoms. But more of this presently.

The organs called stamens and pistils are of great importance in vegetable nature. Invested with all that pertains to reproductive purposes, they have, since Linnæus at least, been held to represent the sexes of animals, and perhaps we can say nothing better about it. A striking circumstance with regard to them is, that while we may trace much affinity between both these organs and other parts of the plant, respectively, we can rarely find any relationship between the stamens and the pistils directly. We may, by cultivation, make stamens change into petals, which are obviously only leaves refined; but we rarely or never succeed in making pistils do any such thing. If they ever change (as they do sometimes, without asking our leave), it always seems to

be into green leaves directly ; and, for a general expression, we may say that a stamen never turns into a pistil, nor *vice versa*.

But the Orchids are above the observance of any rule so exacting. Ignoring the usual distinctive position of these important organs, they constantly place them one upon the other, forming a column-like structure, in which the important part of a stamen, the anther, and the necessary part of a pistil, the stigma, are both to be distinguished, but nothing more. For the rest, you may call it a stamen bearing a pistil or the reverse ; it is either, or neither, as you choose. The common, typical structure of the flower in respect of these organs, is entirely set aside ; and another and different one appears, the presence of which, always constant, is the second mark of this strangely beautiful order.

The third badge is to be found in a circumstance of great significance in connection with those already named, though in itself not of much value as a mark. The orchids are all perennials. No annual plant, shooting up under the influence of the vernal sun, to perish and pass away when the next equinox shall bring the changing season to a less genial temper, appears as a member of this privileged and gorgeous race. Let it be for the Asterids, who enjoy being everywhere and everything, to revel like May-flies in the fleeting hilarities of annual life ; let the Pisids, who have plenty of trees mighty as towers, to spend a fraction of their riches in like manner ; but the Orchids will take a middle station, neither storing up millions in vast trunks, nor squandering them in perishing herbage, planting seed liberally and largely, but giving the nursling always that royal blood that shall insure a life beyond the brief period of a single spring, and one succeeding summer.

Or if we esteem this as too common and uncertain for a sure mark of a family like this, we may take one that is more minute, but rather more characteristic. Every Orchid has a pod for its fruit, with innumerable small seeds within.

Now pods, if they are round, that is, alike on all sides, bear their seeds in two different ways. Either they have a column of some sort running up through the centre of the pod, and the seeds attached to this, or they have no such column, and the seeds hang upon the inside of the outer wall. There is a great difference in these two modes, greater in fact than it is best to trouble the reader with at present. It will be quite enough if he finds out what we mean by the modes themselves. Now if we cut across the pod of any Orchid, just as we would slice a cucumber, the seeds will be found growing *on the sides* of the interior, and *not at the centre*.

If, then, we find plants with these marks, to wit :

I. Irregular flowers,

II. Stamens and pistils consolidated,

III. Perennial habits ; or seeds round the sides of the pod, —then we are safe in looking up to it as a well-accredited member of this regal order. Among the sweltering forests and jungles of India may be found a small family that resembles these considerably, having flowers not quite regular, and stamens and pistils partly coherent ; but we know them to be mere pretenders, when we find their seeds always in the centre of the pod instead of on the walls.

Having thus outlined the characters of this family at some length, it remains to say a word upon their properties and distribution. Two circumstances only can bar these plants from any climate, namely, frost and excessive drouths. Nay, frost itself, if the degree be not that of the arctic, is not enough, for there are seventeen genera and fifty-one species reckoned by Gray in the Northern States east of the Mississippi, and one of them, *Calypso*, is nowhere seen but in the cold bogs of the Canadian region. Never rising into trees, and only rarely to be called shrubs, they stand as small, but most remarkable herbs in all cooler latitudes, while in the moist heats of the tropics they luxuriate as climbers, or take on that very peculiar style of growth sometimes, but wrong-

ly, called parasitic. All through the dense forests of Brazil, in the thickets of the Orinoco, and along the thousand shaded crags and valleys of the Andes, these plants are found in myriads, clinging to the rocks, to old and decaying trees, or to the stronger arms of those not yet dead, strapping their naked, onion-like bulbs to any chance support by roots that seem quite as much like rope-yarns, and with green leaves starting freshly in such curious situations, pushing out long swinging stems of flowers, that dangle hither and thither like strings beset with white or red or bronzy butterflies. Varied with an excess that is perfectly reckless and prodigal, a new form meets the observer at every turn. One botanist dismisses the subject in despair; "a whole life," he says, "would be too short for the figuring of the Orchids of the Peruvian Andes alone." What, then, is to be said of the multitudes that grow elsewhere, from the Rio de la Plata even as far hitherward as the Carolinas? These independent air-plants, as they are often called, have cut loose from the soil, with princely blood too aspiring for a seat so lowly, and mounting to heights and places inaccessible to their, perhaps, envious neighbors; while in turn they scorn to owe them for any but the merest holding-ground, they grow and bloom and triumph like a bird upon the main-trunk, only satisfied with the wildest of perches, nor greatly caring even for that. Often the flowers are redolent of the most powerful and enchanting fragrance, often they are gorgeous with lines that shame the pencil; always they come in such endless diversity of form—form so lovely and so provokingly strange—that we are left at a stand,—there is nothing we can say about them save that God has made and given them beauty in such manner and degree as he has to nothing else among all his wonderful works.

These plants are not less abundant in other regions than those named. Europe has a great many of the terrestrial or rooted sorts, and the Cape of Good Hope is plentifully supplied with the same. The Southern United States also fur-

nish these species freely. But for the other class, the air-plants, we go to the East and West Indies, to Central America and Mexico, to Madagascar and the Indian Islands, and to Nipal and Southern China, and find them in the damp, hot, shaded forests, here, there, everywhere, in thousands upon thousands. Three hundred and ninety-four genera, and at least three thousand distinct species have been described; and no one supposes that more than a beginning has been made. To what an extent the enumeration, if carefully made, might reach, we cannot conjecture; the work is not only almost endless, but is very difficult besides. It is here that we meet with a fact to make the botanist stop and doubt his own eyes. When we have, in some cases, carefully examined and described certain species, so that we know their flowers and growth perfectly, we think, and can distinguish them at sight, all at once,—lo! before us is a plant consisting, as it were, of all these species fused together, with half a dozen kinds of flowers that we have known familiarly, and never saw in connection before, and never suspected of the least alliance, all growing comfortably together on the same spike. Thus was Schomburgk startled, in Demerara, when he found a single plant bearing at once the flowers of a *Monachanthus*, a *Myanthus*, and a *Catasetum*; as if, forsooth, botanists had not long before settled these to be, not only different species, but separate genera. So were the British students surprised, when the same thing afterward appeared in the gardens at Chatsworth; and, later still, when a plant bore two species of *Cynoches* very unlike, but with other flowers whose intermediate forms completely connected the two.

Shall we say with Lindley, that “such cases shake to the foundation all our ideas of the stability of genera and species.” Not at all. If we find such combinations, it simply disproves former suppositions, and shows what we thought permanent and natural divisions to be those of mere varieties, usually observed, it is true, but capable of being thrown



aside, and pointing not to any fixed law of nature. We can well afford to take facts as they are given to us, without seeking to force our preconceived notions on things around us, or going into despair because we discover the falsity of a long-established error.

Attracted by the glorious loveliness of these plants, the florist, if he be rich enough, often adorns his establishment with them. The terrestrial kinds he does pretty well with; he can grow *Cypripediums*, *Ophryses*, *Herminiums*, *Acanthophippiums*, and the like, with no special trouble. But when he comes to the other form, his cares begin. He must hang them up in baskets of dry lumps of peat, upon his greenhouse rafters; or tie them on blocks and sticks and put them in high and airy places, or perhaps build a pile of such loose peat-lumps and put the bulbs on the top. Nay, some are too particular for him to meddle much with them; he must import the rock or stick or dead limb with them already on it, and then he may not succeed after all. Mrs. Loudon complains, that with all the plans of glazing houses with colored glass, using double sashes, training vines over the roof, etc., it has still been impossible to flower some kinds to satisfaction. And all this without saying anything of the hot, steamy atmosphere that must be kept up, half boiling the gardener alive like a Turkish bath, or anything of the more ordinary trouble of importing them from far countries, and having them arrive in doubtful condition, requiring every art for their restoration, and constantly threatening the loss of all expense incurred. Yet, after all, some succeed finely, and are rewarded with the wondrous loveliness of *Stanhopeas*, *Oncidiums*, *Catasetums*, *Cattleyas*, *Dendrobiums*, and *Vandas*, filling their hands with labor, it is true, but their senses with beauty and celestial odors, and their hearts with yet more exquisite perfumes. Witness the impressions these plants may create, in the case of the charming *Peristeria*, the "Flower of the Holy Ghost," before which the Catholic cannot restrain his devotion. In its pure

centre, as in the dearest of nests, sits the imitative organ, in the semblance of an immaculate dove, so spotless and serene in its seeming repose, that we cannot wonder that those whose faith makes hallowed emblems of all things thus suggestive, should have paused, awe-stricken at the first view, and murmured in a half-whisper, "*Ecce Spiritus Sanctus!*"

In speaking of the previous orders, we have considered their degree of usefulness to man. But here there is very little to be said of the kind. Hardly a family among all plants has so little known utility, and here, of course, the real royalty is all the plainer to be seen. The nutritive drug called Salep, and the peerless aromatic, Vanilla, are the most important products of this immense concourse of strangely beautiful things. A few are valuable as medicines, as the Coral-root, the Ladies' Slipper, and one or two more. This is about the end of this part of the story, for, as hinted at the outset, the Orchids are no princes of wealth and treasure, but are royal in their incomparable and exhaustless world of beauty, the fairies and spirit-kings of the vegetable sphere.

We found in the last family that most cogent proof of superior rank and royal origin; the power of spontaneous motion, and a life approaching that of animals. The same thing is revealed here. Not only do several genera have flowers that spring and close in a twinkling to catch the insects that unluckily settle on them, or to resent the touch that profanes their floral serenity, but one, at least, does more than this, and keeps one petal always moving, like a finger pointing this way and that, up and down, as if for entertainment, or perhaps counting the legions of some invisible host whose numbers

"Walk the earth  
Unseen, both when we wake and when we sleep."

We have prattled enough over this family, and yet it is hard to restrain the thoughts and the pen, when considering

a subject so full of charms. It is not mere practical usefulness that entitles this or that production to our notice; the graceful and the beautiful have place in nature, prominent and unquestioned, and if we but listen a moment, we shall hear the pulsations of the inner heart that respond to them, beat for beat. And we shall do well to heed it, and not be angry with ourselves if, stealing a brief space now and then from sterner employments, we give ourselves to the contemplation and enjoyment of that generous and spiritual delight wherewith a bountiful Creator plainly designs to refresh the weary and jaded spirit. We cannot overlook mere beauty here, for the flowers tell us

“ Uselessness divinest,  
Of a use the finest,  
Painteth us, the teachers of the end of use;  
Travellers, weary eyed,  
Bless us, far and wide;  
Unto sick and prisoned thoughts we give sudden truce,  
Not a poor town-window  
Loves its sickliest planting;  
But its wall speaks loftier truth than Babylonian vaunting.”

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## THE BIRDS OF PALESTINE AND PANAMA COMPARED.

BY EDWARD D. COPE.

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It is only lately that means of viewing any class of animals, which the Creator planted in the Holy Land, have been put at our disposal. As it is in the region which appears to have been selected as the first residence of man, an idea of superiority naturally attaches to its products; though we know, indeed, that all rich lands,—such as “flow with milk and honey,”—are prolific of the many outbirths of his manifold laws.

So little has this anciently known region been the field of scientific study, that, excepting among plants, our knowl-